UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/553,990	04/20/2000	Youhao Xu	456962000200	5903

25226 7590 01/23/2006

MORRISON & FOERSTER LLP
755 PAGE MILL RD
PALO ALTO, CA 94304-1018

EXAMINER	
LEUNG, JENNIFER A	
ART UNIT	**PAPER NUMBER**
1764	

DATE MAILED: 01/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/553,990	Applicant(s) XU ET AL.
	Examiner Jennifer A. Leung	Art Unit 1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,6-11,14-27,30-40 and 49-58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6-11,14-27,30-40 and 49-58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 14, 2005 has been entered.

Response to Amendment

2. Applicant's amendment submitted on November 14, 2005 has been received and carefully considered. Claims 4, 5, 12, 13, 28, 29, 36, 37 and 41-48 are cancelled. Claims 1-3, 6-11, 14-27, 30-40 and 49-58 remain active.

Claim Objections

3. Claims 10, 33, 34, 40 and 50 are objected to because of the following informalities:

claim 10, line 2: --optional-- should be inserted before "outlet zone".

claim 33, line 11: [[to]] should be substituted with <u>to</u>.

claim 34, line 3: --optional-- should be inserted before "outlet zone".

claim 40, line 2: --said optional outlet zone and-- should be inserted after "comprises".

claim 50, lines 3-4: "their mixtures" should be changed to --mixtures thereof--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-3, 6, 7, 9-11, 14, 15, 17-23, 25-27, 30, 31, 33-35, 38, 39, 49-51 and 54-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kmecak et al. (EP 0 171 460) in view of Williams (US 4,422,925).

Regarding claims 1, 17, 20, 21 and 25, Kmecak et al. (see FIG. 8; generally, page 38, line 13 to page 41, line 20) discloses a riser reactor and a corresponding process of conducting a hydrocarbon cracking reaction in the riser reactor, wherein the riser reactor (i.e., including portions **1** and **2**), having a riser reactor height and a reactor bottom, comprises, in order from the reactor bottom,

a) a prelift zone (i.e., the restricted diameter portion of the riser **1**, located between the lift gas inlet conduit **4** and the charge oil inlet conduit **5**) having a prelift zone diameter and a prelift zone height and containing catalyst cracking catalyst (i.e., a cracking catalyst, introduced in regenerated form via conduit **3**; page 43, lines 7-26; also, page 14, line 3 to page 17, line 23), the prelift zone being adapted to lift the catalyst to a first reaction zone (i.e., located immediately downstream from inlet **5**) without cracking hydrocarbons in that prelift zone (i.e., the lift gas to the inlet conduit **4** for contacting the regenerated catalyst is a dry hydrogen containing gas, optionally supplemented with steam and/or water, and most preferably containing about 0-6% C3-plus hydrocarbons. Such contact is conducted prior to contacting the regenerated catalyst with heavy oil feed supplied via conduit **5** to be cracked. See page 28, lines 9-25; page 44, line 12 to page 46, line 2);

b) the first reaction zone (i.e., the restricted diameter portion of the riser **1**, located between the charge oil inlet conduit **5** and the frusto-conical transition section to portion **2**, not labeled) having a constant first reaction zone diameter and a first reaction zone height, the first reaction

zone containing catalytic cracking catalyst lifted from the prelift zone and reacting a hydrocarbon (i.e., received from the charge oil inlet **5**) in the first reaction zone; and

c) a second reaction zone (i.e., the expanded or larger diameter portion of the riser **2**) having a second reaction zone diameter that is larger than the first reaction zone diameter and containing catalytic cracking catalyst and reacted hydrocarbons from the first reaction zone.

The prelift zone (i.e., riser **1**, between inlets **4** and **5**) and first reaction zone (i.e., riser **1**, between inlet **5** and the transition) are defined by the same riser reactor portion **1**, and therefore, the ratio of the first reaction zone diameter to the prelift zone diameter is approximately 1:1. Additionally, FIG. 8 clearly shows the second reaction zone **2** diameter being larger than the first reaction zone **1** diameter. In making a rough estimate of the zone diameters using FIG. 8, it would appear to one of ordinary skill in the art that the ratio of the second zone diameter to the first zone diameter is about 3:1. Kmecak, however, does not state the specific ratio of the second reaction zone **2** diameter to the first reaction zone **1** diameter of FIG. 8 within the specification.

Also, in making a rough estimate of the zone heights using FIG. 8, it would appear to one of ordinary skill in the art that the height of the first reaction zone **1**, between inlet **5** and the transition, is about 30% the height of the riser reactor, and the height of second reaction zone **2** is about 50% of the height of the riser reactor. Kmecak et al., however, does not state the specific height of the first reaction zone or the specific height of the second reaction zone **2**, as shown in FIG. 8, within the specification.

In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select the recited dimensions for each of the prelift zone, the first reaction zone and the second reaction zone in the riser reactor of Kmecak et al., on the basis of suitability

for the intended use, because changes in size merely involves routine skill in the art, *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955). Additionally, the precise dimensions of the respective zones of the riser reactor would have been considered a result effective variable by one having ordinary skill in the art, as evidenced by Williams. In particular, Williams et al. (column 4, lines 21-29) teaches a riser reactor wherein,

> "In each of the reactor sections **9**, **10**, **11** and **12**, reaction conditions suitable for substantially optimum conversion of the various hydrocarbon feedstreams introduced into the successive sections of the riser reactor to the desired products may be obtained by variations in vapor velocity, catalyst loading, feed preheats, and regenerator temperature. *The length and diameter of the various sections of reactor 2 are proportioned to maintain a desired reaction time in each section.*"

Accordingly, one having ordinary skill in the art would have routinely optimized the length and diameter of the various zones of the riser in the apparatus and process of Kmecak et al. in order to obtain the desired reaction conditions within each zone for achieving an optimum conversion of a specified hydrocarbon feed, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and where the general conditions of a claim are disclosed in the prior art, discovering optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 2, 18 and 26, Kmecak et al discloses the riser reactor may comprise a vertical length of about 49 meters, or about 160 feet (page 49, lines 7-23). Additionally, Kmecak et al. discloses, "The riser reactor may be substantially any desired vertical length which will be compatible with the adjacent catalyst regeneration apparatus..." (page 41, lines 15-20).

Regarding claims 3, 19 and 27, in making a rough estimate of the prelift zone height using FIG. 8, it would appear to one of ordinary skill in the art that the prelift zone **1** height, between inlet conduits **4** and **5**, is about 10% of the height of the riser reactor. Kmecak,

however, does not state the specific height of the prelift zone within the specification. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriate dimensions for the prelift zone in the riser reactor of Kmecak et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise dimensions would have been considered result effective variables by one having ordinary skill in the art, as evidenced by Williams et al (see above). Accordingly, one having ordinary skill in the art would have routinely optimized the diameter and height of the prelift zone relative to the dimensions of the riser reactor in the apparatus and process of Kmecak et al. in order to obtain the desired reaction conditions and reaction time within the system for achieving an optimum conversion of a specified hydrocarbon feedstream, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 6, 22 and 30, Kmecak et al. discloses an outlet zone having a height of 0% of the riser reactor height. Thus, a specific diameter for the outlet zone is not applicable.

Regarding claims 7, 23 and 31, Kmecak et al. further discloses, in FIG. 8, a first junction section (i.e., the frusto-conical transition zone, not labeled) between the first reaction zone (i.e., the riser **1** portion, above inlet **5**) and the second reaction zone (i.e., riser **2** portion), wherein the first junction section forms a circular truncated cone shape. Kmecak, however, does not specifically state that the first junction section has a "vertical section vertex angle" in the range of about 30° to 80° within the specification. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate vertex angle

for the first junction section in the apparatus and process of Kmecak et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise angle would have been considered result effective variable by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would have routinely optimized the vertex angle of the first junction section relative to the dimensions of the first and second reaction zones in the apparatus and process of Kmecak et al., in order to obtain the desired reaction conditions and reaction time within the system for achieving substantially optimum conversion of a specified hydrocarbon feedstream, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 9, 14, 33 and 38, the same comments with respect to Kmecak et al. and Williams et al. apply. Kmecak et al. further discloses an outlet zone having a height of 0% of the riser reactor height. Thus, a specific diameter for the outlet zone is not applicable. Furthermore, the first reaction zone of Kmecak et al. will be inherently capable of being configured so that a hydrocarbon cracking reaction takes place at a higher reaction temperature, higher ratio of catalyst to oil, and shorter reaction time than, respectively, a reaction temperature, ratio of catalyst to oil, and a reaction time of the second reaction zone, by virtue of the placement of the feedstock inlet 5, catalyst inlet **3**, the relative reaction zone heights, and enlarged second reaction zone **2** diameter with respect to the first reaction zone **1** diameter (see FIG. 8).

Regarding claims 10 and 34, the same comments with respect to Kmecak et al. apply. (see comments made regarding claims 2, 18 and 26 above).

Regarding claims 11 and 35, the same comments with respect to Kmecak et al. and Williams et al. apply. (see comments made regarding claims 3, 19 and 27 above).

Regarding claims 15 and 39, the same comments with respect to Kmecak et al. apply. (see comments made regarding claims 7, 23 and 31 above)

Regarding claims 49-51, 56 and 57, Kmecak et al. further discloses a conduit (i.e., inlet **7** or **8**; FIG. 8) adapted to supply a quenching medium or a reactable feedstock (i.e., residual oil feed via inlet 7; steam and/or water introduced as diluent via inlet **8**; page 40, line 1 to page 41, line 6) between the first reaction zone (i.e., the riser **1** portion, between inlet **5** and the transition) and the second reaction zone (i.e., the riser **2** portion). The quenching medium inlet inherently functions as a heat exchanger in the second reaction zone **2**, for cooling at least a portion of hydrocarbon and catalyst passing from the first zone to the second zone.

Regarding claim 54, Kmecak et al. further discloses a conjunct zone (i.e., the frusto-conical transition zone, not labeled, see FIG. 8) between the first reaction zone (i.e., the riser **1** portion, above inlet **5**) and the second reaction zone (i.e., riser **2** portion).

Regarding claim 55, Kmecak et al. further discloses a conduit (i.e., inlet **9** or **10**; FIG. 8). adapted to introduce quenching medium (i.e., residual oil feed via inlet **9**; steam and/or water introduced as diluent via inlet **10**; page 40, line 1 to page 41, line 6) between the second reaction zone **2** and the outlet zone.

5. Claims 8, 16, 24, 32 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kmecak et al. (EP 0 171 460) in view of Williams (US 4,422,925), as applied to claims 1, 9, 17, 25 and 33 above, and further in view of Watts (US 2,377,657).

Kmecak et al. is silent as to the riser reactor being configured with an outlet zone and a

second junction section located between the second reaction zone **2** and the outlet zone, wherein the second junction section has a circular truncated cone shape. Watts (see FIG. 1) teaches a riser reactor **11** comprising an outlet zone (i.e., the upper narrowed portion of reactor **11**) and a conjunct section (i.e., labeled as false head **16'**) located between the outlet zone and a reaction zone, wherein the outlet zone has a circular truncated cone shape (page 2, column 2, lines 49-66). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the riser reactor of Kmecak et al. to comprise an outlet zone and second junction zone, on the basis of suitability for the intended use thereof, because, "When the diameter of the reactor is narrowed at its upper end and a false head **16'** is adjustably supported therein, the effective volume of the catalyst chamber, i.e., the dense phase catalyst level therein may be easily controlled," as taught by Watts. Although the collective teachings of Kmecak, Williams and Watts are silent as to the second junction section having a vertical section vertex angle with respect to the reactor axis in the range of about 45 to 80 degrees, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate vertex angle for the second junction section in the modified apparatus and process of Kmecak et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise angle would have been considered result effective variable by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would have routinely optimized the vertex angle of the first junction section relative to the dimensions of the first and second reaction zones in the modified apparatus and process of Kmecak et al., in order to obtain the desired reaction conditions and reaction time within the system for achieving substantially optimum conversion of a specified hydrocarbon feedstream, *In re Boesch*, 617 F.2d. 272, 205

USPQ 215 (CCPA 1980), and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

6. Claims 52, 53 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kmecak et al. (EP 0 171 460) in view of Williams (US 4,422,925), as applied to claim 1 above, and further in view of Carr et al. (US 3,639,228).

Kmecak et al. is silent as to the quench medium comprising catalyst (e.g., regenerated catalyst with a residual carbon content of less than about 0.1 wt%, semi-regenerated catalyst having a residual carbon content of at least 0.1 wt% to about 0.9 wt%, or fresh catalyst). Carr (FIG. 1) teaches the introduction of catalyst at various locations (i.e., via catalyst pipes **18** and **20**) downstream from the inlet of the reactor (i.e., adjacent catalyst inlet **16**). The catalyst may comprise regenerated or semi-regenerated catalyst (i.e., regenerated catalyst with a level of carbon on the regenerated catalyst from about 0.05 to 0.3 percent by weight; column 5, lines 34-59), as well as fresh catalyst (i.e., supplied via make-up catalyst line **66**). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a quenching medium comprising catalyst to the riser reactor in the modified apparatus of Kmecak et al., on the basis of suitability for the intended use thereof, because the downstream injection of additional catalyst increases the yield and selectivity of the cracking reaction within the riser reactor by shifting a major portion of the cracking reaction away from the inlet end of the reactor and thereby distributing the cracking reaction over the length of the riser rather than concentrating the reaction at the inlet of the riser, as taught by Carr et al. (column 1, lines 33-73).

Response to Arguments

7. Applicant's arguments filed November 14, 2005 have been fully considered but they are not persuasive. Looking only to the data provided on page 49, lines 8-24, of Kmecak, et al. (in the "specific embodiment" for FIG. VIII), the following can be said of the riser reactor:

- riser reactor height = about 49 meters
- average linear velocity of the suspension in the riser reactor = about 24 meters/sec
- total time required to traverse the riser reactor = about 2 seconds
- total time within the prelift zone of the riser reactor (i.e., the dry gas-steam-catalyst suspension residence time before contact with the atomized oil feed) = a fraction of a second up to 0.5 seconds
- total time within the first reaction zone, second reaction zone, and first conjunct section, combined (i.e., a hydrocarbon residence contact time with catalyst particles) = up to about 1 or 1.5 seconds.

In the case that the total residence time within the riser reactor is set at 2 seconds, we can properly assume a residence time of roughly 0.5 seconds within the prelift zone and a residence time of roughly 1.5 seconds within the first reaction zone, second reaction zone, and first conjunct section, combined (as suggested in the data above).

Looking now to Figure VIII, we can further assume from the proportions given in the drawing that the riser reactor is roughly configured as follows:

- Pre-lift zone height (0.1*H) = 4.9 meters
- First reaction zone height (0.3*H) = 14.7 meters
- Second reaction zone height (0.5*H) = 24.5 meters
- First conjunct section height (0.1*H) = 4.9 meters

where H is the total height of the riser reactor, or H = 40 meters. Subsequently,

- the average linear velocity of the suspension in the prelift zone equals the height of the prelift zone divided by the residence time within the prelift zone, or **approximately 9.8 m/s** (calculated from 4.9m ÷ 0.5s = 9.8 m/s); and
- the average linear velocity of the suspension in the first reaction zone, second reaction zone and first conjunct section, combined, equals the sum of the heights of the first reaction zone, second reaction zone and first conjunct section divided by the sum of the residence time within the first reaction zone, second reaction zone and first conjunct section, or **approximately 29.4 m/s** (14.7m + 24.5m + 4.9m) ÷ 1.5 s = 29.4 m/s).

These values clearly contradict the calculated values proposed by applicant. In particular, Applicants (page 24, lines 18-25) argue that,

> "It would be apparent to a person of skill in the art that the maximum linear velocity of the prelift section (the restricted diameter portion of the riser 1) is about 5 m/s, i.e., the linear velocity at the inlet of the first reaction zone is 5 m/s, the linear velocity at the outlet of the first reaction zone is 31 m/s, and the average linear velocity of the first reaction zone is 14.4 m/s, so that the oil gas contacts the catalyst for 1.02 seconds in the first reaction zone, and the oil gas contacts the catalyst for 2.8 seconds altogether in the first and second reaction zones. These values were calculated with the proviso that the linear velocity at the outlet of the first reaction zone is 31 m/s."

However, as shown in the calculation above, the average linear velocity of the suspension in the prelift zone is about 9.8 m/s, at a total riser reactor average linear velocity of 24 m/s. The calculated average linear velocity within the prelift zone is well above the 5 m/s argued by Applicants. Additionally, the data provided by Kmecak, cited above, clearly states that the oil gas contacts the catalyst for a maximum of 1.5 seconds altogether, at a total riser reactor average linear velocity of 24 m/s. The cited residence time of oil gas/catalyst contact is well below the 2.8 seconds argued by Applicants. Furthermore, the cited residence time was for a total riser

reactor average linear velocity of 24 m/s, which is below the maximum average linear velocity of 31 m/s, in which Applicants have used in their calculations. Clearly, a velocity of 31 m/s would produce an even shorter oil gas/catalyst contact time than the stated 1.5 seconds. Additionally, Kmecak discloses that, "[t]he short residence times identified are not detrimental to the process and may be used with considerable advantage to maintain desired product selectivity by reducing any tendency of over-cracking to occur." (page 49, lines 20-23).

Beginning on page 27, within the last paragraph, Applicants further argue,

> "... the combination of references does not render the claims obvious. The Examiner states that the precise dimensions of the respective zones of the riser reactor would have been considered a result effective variable by a person of ordinary skill in the art, in view of Williams. However, since, as discussed above, Williams does not teach a reactor with the same configuration or reaction zones as the presently claimed invention, this reference would not have provided motivation to vary the diameters of the reaction zones in a device configured as in the instant invention."
>
> "Applicants disagree with the Examiner's characterization of the standard for obvious under 35 U.S.C. §103. A *prima facie* case of obvious requires, *inter alia*, that a prior art reference (or references when combined) must teach or suggest all the limitations of a claimed invention. Thus, the Examiner's statement that the test for obviousness does not require that the claimed invention be "expressly suggested in any one or all of the references" is incorrect. The test for obviousness specifically requires that a cited combination of references teach or suggest every element of a claimed invention."

Applicant argues that because Williams does not teach a reactor of the same configuration or reaction zones as Kmecak, the teachings of Williams cannot be combined with the disclosure of Kmecak. However, the Examiner again asserts that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary

reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, the structural features of the riser reactor in Williams et al. were not meant to be bodily incorporated into the riser reactor of Kmecak et al. The Williams reference was merely provided to illustrate that the variation of reactor diameter and reactor length to obtain a desired reaction time within a particular zone of the reactor is well known in the art. Also, note the difference between "*expressly* suggested" and "suggested".

As found under M.P.E.P. Section 2141, titled " ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS,"

> "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves <u>or in the knowledge generally available to one of ordinary skill in the art</u>, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach <u>or suggest</u> all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP §2143-§2143.03 ..."

The concept of varying the diameter and length of a particular zone of a riser reactor, to obtain a desired residence time within that particular zone, is knowledge that is generally available to one of ordinary skill in the art. Williams et al. was cited in the rejection to evidence that such knowledge is generally available to one of ordinary skill in the art. This well-known concept is further evidenced by Farnsworth (column 5, line 65 to column 6, line 16). In particular,

> "... the hydrocarbon contact time and velocity within the riser cracking zone may be controlled within desired predetermined limits within respective sections of the riser conversion zone of different diameter limits. In this arrangement the hydrocarbon contact time in the more restricted diameter portion of the riser may be limited not to exceed about 1 second or other selected time interval with the hydrocarbon residence time in the larger diameter portion of the riser restricted to within the range of 0.5 to 2 seconds and most suitable for achieving desired conversion of the heavy oil feed charged thereto."

There exists a reasonable expectation of success, given that riser reactors having an enlarged diameter portion have been successfully employed in the prior art for cracking hydrocarbons. See riser reactor **1/2** in Kmecak FIG. 8; riser reactor **1** in Farnsworth FIG. 1. See also the conventional riser (on the right hand side) in Sharp et al. FIG. 4.

The prior art references of Kmecak and Williams, when combined, teach or suggest all the claim limitations. The teaching or suggestion of a riser reactor having a ratio of the second reaction zone diameter to the first reaction zone diameter from about 1.1 to about 2:1 can be seen in the illustration of the riser reactor in FIG. VIII of Kmecak. Here, Kmecak clearly shows a riser reactor having a second reaction zone **2** diameter at roughly three times the diameter of the first reaction zone **1**. Because these dimensions were only shown by illustration (and not stated in the specification of Kmecak), Williams et al. was cited to illustrate that variations in the diameter to fit the claimed range merely involves routine skill in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
January 18, 2006 jal

Hien Tran

HIEN TRAN
PRIMARY EXAMINER